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October 14, 2003

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Subject: Licensee Event Report 50-458 / 04-001-00
River Bend Station – Unit 1
Docket No. 50-458
License No. NPF-47

File Nos. G9.5, G9.25.1.3

RBG-46342
RBF1-04-0182

Ladies and Gentlemen:

In accordance with 10CFR50.73, enclosed is the subject Licensee Event Report.

Sincerely,

David N. Lorfing
Manager – Licensing (acting)
DNL/dhw
enclosure

IE22

cc: U. S. Nuclear Regulatory Commission
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NRC FORM 366 (7-2001) | U.S. NUCLEAR REGULATORY COMMISSION | APPROVED BY OMB NO. 3150-0104 | EXPIRES 7-31-2004

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
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4. TITLE

Automatic Reactor Scram Due to Main Generator Trip Resulting from Switchyard Fault

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
08	15	2004	2004	- 001 -	00	10	14	2004	FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE	1
10. POWER LEVEL	100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)
20.2203(a)(1)	50.36(c)(1)(i)(A)	X 50.73(a)(2)(iv)(A)	73.71(a)(4)
20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)
20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER Specify in Abstract below or in NRC Form 366A
20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)	
20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)	
20.2203(a)(2)(v)	50.73(a)(2)(i)(B)	50.73(a)(2)(vii)	
20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)	
20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)	

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
David N. Lorfing, Manager – Licensing (acting)	225-381-4157

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
C	FK	BKR	(see text)	no					

14. SUPPLEMENTAL REPORT EXPECTED			15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

At 4:05 a.m. on August 15, 2004, with the plant operating at 100 percent power, an automatic reactor scram occurred as a result of a main turbine trip. A fault caused by failure of a 230kv transmission tower remote from the River Bend switchyard initiated a trip signal to an oil circuit breaker in the switchyard. Slow operation of some of the switchyard breakers caused a failure to clear the fault within the design timeframe and the initiation of the breaker failure scheme. This resulted in a trip of one of the two main generator output breakers. Due to the slow clearing time, the ground fault protection system for the main generator step-up transformers also responded to the fault signal and tripped the remaining main generator output breaker. The resulting electrical transient also caused the loss of power to the Division 2 standby switchgear, which caused the automatic start of the Division 2 diesel generator. The reactor core isolation cooling system was initiated manually following the loss of the third main reactor feedwater pump. This event is being reported in accordance with 10CFR50.73(a)(2)(iv)(a) as an event that resulted in the initiation of the reactor protection system, the Division 2 diesel generator, the reactor core isolation cooling system. The breakers of the type that exhibited slow operation were inspected and lubricated, or left out of service for plant startup. This event was of low actual safety significance, as the plant response was within the bounds of the safety analysis. All safety systems responded as expected.

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REPORTED CONDITION

At 4:05 a.m. on August 15, 2004, with the plant operating at 100 percent power, an automatic reactor scram occurred as a result of a main generator (**TG**) trip and subsequent main turbine trip. The 230kv oil circuit breakers (**BKR**) at the River Bend switchyard (known as Fancy Point) responded to a fault signal on the 230kv transmission system remote from the switchyard. The fault was initiated by the failure of a guy wire, leading to a structural failure of a 230kv transmission tower (**TWR**). This event is being reported in accordance with 10CFR50.73(a)(2)(iv)(a) as an event that resulted in the initiation of the reactor protection system, the Division 2 diesel generator, the reactor core isolation cooling system.

Slow operation of a total of four 230kv breakers at Fancy Point resulted in operation of breaker backup protection and led to the loss of one of the two main generator output breakers and loss of power to the Division 2 standby switchgear, as well as parts of the balance-of-plant electrical system. The Division 2 diesel generator (**DG**) started as designed and restored power to its switchgear. In addition, the ground fault protection system for the main generator step-up transformers actuated due to the delay in the fault clearing time. This resulted in the trip of the remaining generator output breaker.

The main generator trip signal initiated a turbine trip signal, which then initiated the reactor scram. The turbine trip caused an expected reactor pressure transient that caused the actuation of all sixteen main steam safety relief valves. The inboard main steam isolation valves were closed manually in anticipation of a loss of main condenser vacuum. Seven main steam safety relief valves were subsequently cycled manually to assist in controlling reactor pressure.

The "B" reactor recirculation pump shut down due to the loss of its power supply, and the "A" reactor recirculation pump downshifted to slow speed due to the reactor low water level alarm at the time of the scram. This alarm is an expected momentary phenomenon associated with the reactor pressure transient that occurs upon a trip of the main turbine.

Two reactor feedwater pumps shutdown at the time of the scram due to loss of their power supplies. The remaining "A" main feedwater pump tripped automatically at approximately 4:35 a.m. when reactor water level reached the high alarm setpoint. The reactor core isolation cooling (RCIC) system was initiated manually following the loss of the third main reactor feedwater pump. The outboard main steam isolation valves were closed to maintain the reactor cooldown rate within limits.

The standby gas treatment system, control building emergency ventilation system, and annulus mixing system started automatically due to loss of the reactor protection system bus "B" and the associated ventilation isolation signals.

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The "A" feedwater pump could not be immediately restarted due to a loss of instrumentation power which disabled permissive interlocks required for the pump start sequence. Power was subsequently restored to the affected instrument buses and to the motor-operated valves in the feedwater regulating system.

The main condenser mechanical vacuum pump "B" was unavailable due to the loss of power, and the "A" mechanical vacuum pump failed to start due to a faulty relay in its feeder breaker. The "A" mechanical vacuum pump was subsequently started at 6:40 a.m.

No safety systems were out of service at the time of the event.

BACKGROUND

The Fancy Point switchyard provides the connection to the offsite grid for the main generator, as well as the two independent sources of offsite power to the plant's safety-related buses. The switchyard contains the two 230kv buses, referred to as the North and South buses, which are connected by five cross-tie "bays" and their associated breakers arranged in a "breaker-and-a-half" scheme. A sixth bay provides connection of one line only to the North bus. The switchyard provides the connections to the 230kv transmission lines entering and leaving the switchyard, as well as the River Bend generator. There are four 230kv lines exiting the station connecting to the transmission grid, two lines which provide offsite power to River Bend and a main generator output line. The circuit breaker arrangement allows the two River Bend offsite power lines, the main generator line, and three of the four lines exiting the switchyard to be connected to either the North or South bus. The remaining line exiting the station can be connected only to the North bus.

Fancy Point also contains a 500kv bus system, with transformers and breakers tied to external transmission lines which connect to the 230kv system via a 500/230kv auto-transformer. These components were unaffected by this event.

INVESTIGATION

The initiating event for the fault in the Fancy Point switchyard was the failure of a guy wire on a 230kV transmission tower on one of the four transmission lines south of the site. The guy wire failure allowed the pole to collapse and lean over causing a phase-to-ground fault. The faulted line connects only to the Fancy Point north bus. The associated circuit breaker at Fancy Point received a trip signal to clear the fault, but its operation was slow, resulting in actuation of the back-up breaker protection. All other circuit breakers on the North bus were tripped by the back-up protection system, but two of these also operated slowly. The fault was eventually isolated, but the River Bend main generator step-up transformer ground fault protective relay had already actuated due to the extended fault duration. The actuation of this relay resulted in the main generator trip, which in turn caused the main turbine trip and a reactor scram. Had the

breaker on the faulted line opened properly, the fault on the North bus would have likely cleared without the activation of the back-up breaker protection trip or the main generator ground fault protection relay.

The structural failure of the 230kv tower also caused a second, short duration fault on a second line, adjacent to the faulted line, when the static line attached to the top of the failed structure broke and momentarily contacted or otherwise violated minimum clearance for the "C" phase. The breaker for this line also operated slowly. This resulted in operation of the remaining breaker for the reserve station service no. 2 and loss of power to the Division 2 safety related bus.

CAUSAL ANALYSIS

Laboratory examination of the failed guy wire found that it had likely been damaged by a lightning strike. Records of lightning activity in the area indicated a high-amperage strike near the line a few weeks before the event, which corroborates this conclusion. It is postulated that the damaged guy wire broke when the overnight temperature drop caused tension on the conductors and guy wire to increase.

The scram investigation team found that the Fancy Point 230 kV circuit breakers (McGraw-Edison RHF-90 breakers with OA-4 operating mechanisms) were not properly inspected and maintained. The McGraw-Edison breaker trip mechanisms had not been properly lubricated in the time frame and locations specified by the vendor. These conditions caused 4 of the 230 kV circuit breakers in the Fancy Point switchyard to open slowly in response to the offsite electrical faults. This ultimately resulted in actuation of the main transformer protective relaying scheme, causing the main turbine trip and reactor scram.

Additionally, circuit breaker speed time testing provided inaccurate data due to a testing methodology that inadvertently pre-conditioned the breakers just prior to testing, thereby biasing the test results. The test methodology utilized test equipment that required the breaker to be open and isolated for connection. It was determined that the predictive maintenance (PM) instructions for the 230kv breakers are general in nature and rely on vendor manuals to supply the necessary details. However, the vendor manuals are not written to a level of detail that gives the maintenance technician specific instructions on which parts to lubricate and how often lubrication is needed. The instructions are not sufficient to ensure correct and repeatable maintenance of the breakers. As such, Transmission department maintenance personnel depend heavily on experience and "skill of the craft" to perform the task.

The last major PM of the breakers was performed in 1989. During this maintenance, lubrication was performed on an as-needed basis. This maintenance did not involve cleaning of the old lubricant but rather addition of an aerosol spray. This method of lubrication, while providing short term improvement in breaker trip time performance, actually resulted in degradation of the grease in the mechanism.

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IMMEDIATE CORRECTIVE ACTIONS

Immediate actions taken for this event include lubrication of the trip mechanism for the McGraw-Edison breakers at Fancy Point switchyard per vendor recommendations. All but one of the breakers showed marked improvement in the operating time during testing as well as in the repeatability of the timing of the breaker trip. The breaker which showed no improvement was left out of service. Following the corrective maintenance, the plant was returned to operation.

CORRECTIVE ACTION TO PREVENT RECURRENCE

The following actions have been taken to avoid a future recurrence of this event.

1. Offsite distribution lines tied to Fancy Point of similar construction to the failed line were inspected. Deficiencies were identified and repaired.

2. All McGraw-Edison breakers in the Fancy Point switchyard were inspected and lubricated per vendor recommendations.

3. Breaker testing methodology has been revised to eliminate any potential masking of slow operation.

4. A vendor representative was brought on site to assist in optimizing the predictive maintenance work instructions for the affected breakers.

5. A program of accelerated time testing of the McGraw-Edison breakers has been initiated.

Additional corrective actions are documented in the station corrective action program.

PREVIOUS OCCURRENCE EVALUATION

Slow operation of the 230kv breakers at Fancy Point has been previously documented in December 2002 and June 2004.

Actions for the December 2002 event included lubrication of the mechanism for the breaker exhibiting the slow trip time, along with a commitment from the Transmission department to change the predictive maintenance frequency from 4 to 2 years. Two years have not elapsed since this event occurred.

Actions for the June 2004 event included rework of the affected breaker, testing of the other like breakers in the switchyard, and assignment of an action to work with the

Transmission Department to determine the true cause of slow operation and review of the testing frequency. This action was not complete as of the time of the August 15 scram.

Neither of these previous conditions caused a reactor scram or loss of power to the plant's safety-related buses.

SAFETY SIGNIFICANCE

This event was of very low safety significance. The response of the plant in this event was bounded by the load reject event with turbine bypass valve actuation, as documented in the River Bend Updated Safety Analysis Report. All safety systems responded as designed.

(NOTE: Energy Industry Component Identification codes are annotated as (**XX**).)